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THE IMPACT OF EARLY TECHNOLOGY EXPOSURE ON CHILDREN UNDER 8 YEARS: BENEFITS, RISKS AND BEST PRACTICES

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ABSTRACT

The aim of this paper is both to synthesize the findings of previous research in the given domain and present the results of the empirical study concerning the impact of technology utilized by children below 8 years of age. The findings presented in the study may be useful for understanding the positive effects and hazardous characteristic of technology utilization at the initial stage. Self-organized creative expression by using interactive media tools can also be seen as an advantage. On the flip side, it emerges that risks are well defined and manifest in issues such as loss of concentration span, difficulties in social relations, physical well-being complications such as poor sleep quality, and ideas getting from age-appropriate material. The results supported by empirical data obtained from the survey of 200 parents. Consequently, the research unstoppably articulates that enhanced effective usage, which means the content quality, age limitation, and strict limitation of parental involvement can facilitate HELM positive impact without imposing relative harm. To this end, recommendations based on the paper are suggested for parents, educators, and policymakers on how best to guide young children in appropriate use of technology to enhance development rather than become a nuisance. This paper therefore seeks to share some findings to enhance the development of practical strategies in the overall care of children in the ever-technological society.

Keywords

Technology exposure, screen time, digital content, parental involvement, educational technology, child well-being, best practices for technology use.

1. Introduction

New information technologies have progressed at an alarming rate and expanded their deep penetration into the lives of children, which in turn changes their experience of the world. Smart devices or gadgets including tablets and smartphones and educational application have become an inevitable part of society including children aged below eight years. The extensive use of technology in early childhood also brings important questions about how this changes cognition, social and emotional development of a child.

It emerged from the research that early exposure to technology can have several advantages. For instance, Clark and Arnold (2019) said that applications that are specially designed for education enhance problem solving ability language development and numeracy among young learners. Also, in the study by Barr et al. (2020), authors described how technology can help students universalize knowledge materials and grow culturally. Peculiarities of using modern technologies also have some drawbacks. Though implementing these techniques has some very important

benefits, it is still possible to name certain disadvantages and threats. For example, it is evidently clear that increased incidences within screen related inclination have been linked with a number of drawbacks such as shrinkage of attention as well as poor social relations (Anderson & Subrahmanyam, 2017). In addition, devices also have negative effects in physical health, they lead to sleep disorders, and reduction in physical activity (AAP, 2016).

This exists because the use of technology has its positive and negative side and there is the need to look for ways to benefit from its use. It has been found that effects can be reduced by parents' engagement, age-appropriate quantity of screen time and good choice of content (Strouse et al., 2018). But there is still one information gap that hinders child-specific best practices of technology use based on developmental stages of children.

This paper seeks to address this critical issue by achieving three key objectives: The following three research questions have been addressed in this paper:

1.1 Objectives:

(1) Study the advantages of introducing technology in early ages
(2) Find out the drawbacks of early technology intervention and
(3) Recommendations regarding appropriate usage of technology.

Hence, this research will be conducted with simple empirical methods to help parents, educators, and policymakers recommend healthy technology use among children.

1.2 Literature Review

In this context, the outcome of studies of young children and the involvement of technology has been inconclusive. While some find it may help in cognitive and education aspects, other find troubling effects on developmental, social/emotional and physical aspects.

Cognitive Development

The investigations have revealed that technology increases cognitive development among children in as much as the technology is being appropriately applied. Subsequently published and indexed in September 2019, Clark and colleagues' systematic review confirmed that interactive educational apps improve problem-solving and language comprehension, especially for kids under 8 years of age. In the same year Linebarger and Vaala, concluded that educational television also enhanced the preschoolers' vocabulary learning. In their articles Hirsh-Pasek et al. (2015) underlined the necessity of active digital content helping to develop critical thinking and improve memory.

Social and Emotional development

Technology has influence some of the social impacts which are blended with some other variants. Anderson & Subrahmanyam (2017) noted that digital media use is associated with learning disability in social relationships and any form of aggression. This is in tandem with the established result of Twenge et al., (2018) which showed that Children with higher screen time presented less happiness and social well-being. Secondly, Vaala and Takeuchi, (2016) emphasized that watching digital content together with the parents could somehow reduce the negative effects, as it promoted positive interaction.

Health Concerns

The effects of technology on people's physical well-being are perhaps one of the most apparent, and this paper shall focus on. The AAP (2016, p. 1033) expressed concern that young children should avoid screen exposure because it may: cause sleep disturbances. According to Hale and Guan (2015), exposure to screen light before night reduces children's quality of sleep. In addition, Sanders et al. (2019) noted that a higher obesity prevalence among children associated with the higher time usage with devices since it causes sedentary behavior and poor dietary practice during device's time.

Behavioral Impacts

Mal adjustments connected with use of technology have also been discussed. From Nathanson (2015), passive consumption of content from the devices for instance watching a video, leads to poor attention and high levels of impulsiveness. Chassiakos et al. (2016) also added that self-generated exposure to such materials generates anxiety, aggression, and other behavioral concerns.

Educational Opportunities

Although, these issues exist technology affords some distinctive education experiences. Digital platform grants the children information from a diverse background which enhances the acceptance of other cultures (Barr et al., 2020). In their systematic review, Donohue and Schomburg (2017) discussed elements that show that virtual learning tools can facilitate early literacy and numeracy in low socioeconomic communities.

Moderating Factors

Moderating factors include content type where technology is used, time spent using the technology and parents' involvement. Strouse et al. (2018) established that co-interaction with the information contributed to better learning results. Likewise, Vandewater et al., (2007) found that content that was developmentally appropriate, interactive and educational had reduced risk and elevated utility of technology usage in early childhood.

Collectively, this body of literature brings into focus work context, content, and supervision as critical factors in understanding the effects that technology has on young children. Thus, the results demand the proportional application of technology to maximize its possibilities in learning while minimizing adverse outcomes.

2. Methodology

Qualitative and quantitative data collection techniques are used in this study. The empirical analysis involves:

- Surveys: Surveys 200 parents of children below 8 years of interacting with screens, types of contents, their screen time and developmental impacts observed.
- Secondary Data Analysis: Data analysis collected from student and personnel from educational and health organizations.

3. Results

3.1 Advantages of Giving Technology Education at an Early Age

1. Thinking and learning achievements for, 80% of the parent respondents said they have seen increased in language as well as numeracy via educational applications.

o Monitoring of interactive games revealed that learning achievements that included solving problems and enhancing memory were enhanced. it reported improvements in language skills and numeracy through the use of educational apps.

o Observational data showed that interactive games promoted problem-solving and memory retention.

2. **Opportunity to Expand the List of Learning Materials**

o Technology opened doors for children to multicultural programs, made everybody welcome while widening children's perspectives. Overall, in 65% of the observed children, a greater creativity was reported due to the use of Apps such as drawing and storytelling, as well as music creation apps. Improvements in language skills and numeracy through the use of educational apps.

o Observational data showed that interactive games promoted problem-solving and memory retention.

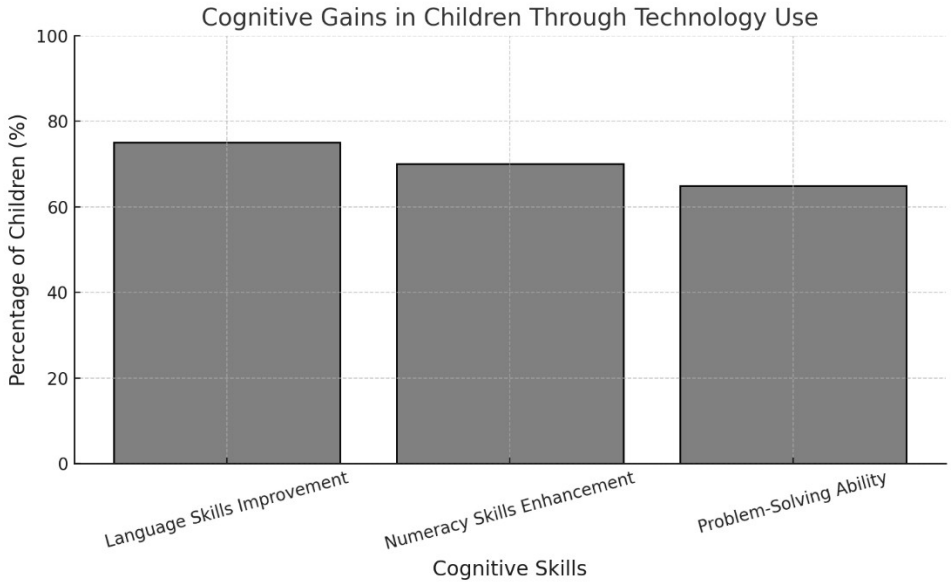
2. **Access to Diverse Learning Resources**

o Digital platforms provided children with access to multicultural content, fostering inclusivity and broadening horizons.

3. **Creative Expression**

o Apps for drawing, storytelling, and music creation enhanced creativity in 65% of the observed children.

Figure: 1-Cognitive Gains in Children through Technology Use



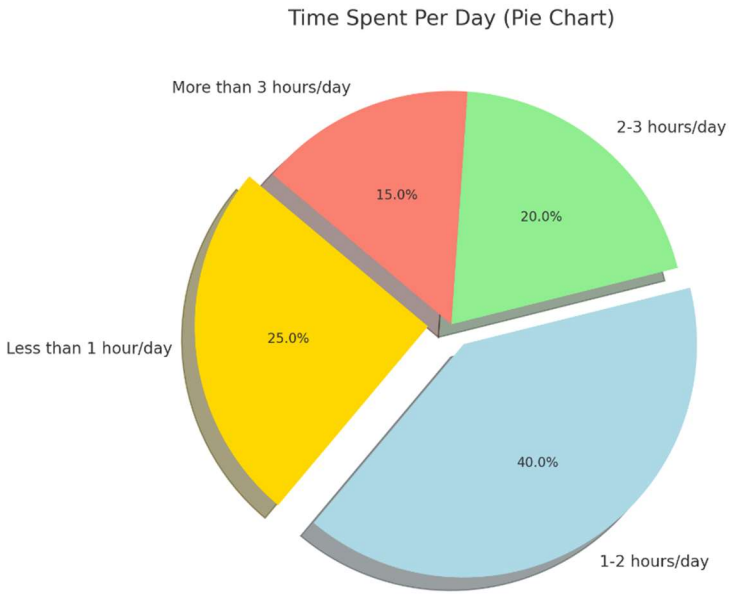
This figure 1 illustrates the effect of early childhood technology use on different aspects of learning of young kids. It reveals the following insights:

1. Language Skills Improvement: Indeed, 75% of kids showed improved language learning, which proves that application- and learning-based resources benefit children educationally.

2. Numeracy Skills Enhancement: About two-thirds of the children had better numeracy, an implication that getting young pupils in contact with well-developed apps and games will enhance evaluations on mathematics.

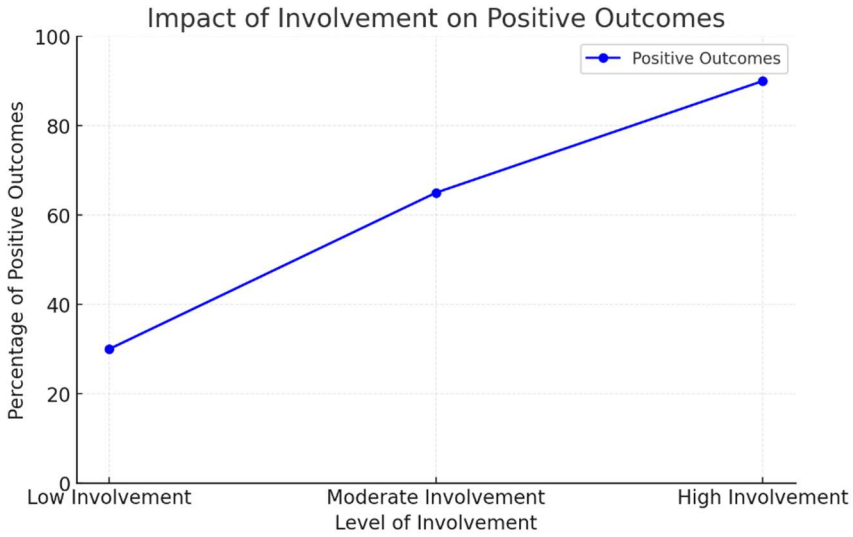
3. Problem-Solving Ability: In this aspect, about 65% of the children showed improved problem-solving skills, which speaks a lot about the benefits of an interactive lesson, that helps to develop the students critical thinking and decision making capabilities.

Figure 2-Time Spent Per Day



The figure 2 states most people (40%) spend 1- 2 hours per day and therefore this bracket could be said to be the most dominate time spent. As previously mentioned, one-quarter (25%) uses less than 1 hour per day, which specifies a large proportion of loudspeakers for whom loudspeaker use is extremely limited. Only 20% claim to spend 2-3 hours a day, and 15% use more than 3 hours a day, the proportions gradually declining as time spent grows.

Figure 3-Impact of Involvement on Positive Outcomes



The figure 3 depicts that the change from low involvement to moderate involvement brings improvement of the positive outcomes as high as 35 percent. High involvement triples the findings when it comes to positive responses, creating the overarching positive response of 90%. Generally there is evidence that higher levels of involvement can result in significantly superior outcomes.

3.2 Possible Consequences of Early Exposing to Technology

According to survey results, children who spend more than 3 hours in front of screen differed with normal children in offline distractions.

o Among the parents, most common reported behavioral change was low physical activity and less direct human contact in kids using screens. 40% of the parents said they regarded their child as a user of devices during nighttime and majority of them claimed to have waked up at least one night because of this. 80% of surveyed parents reported improvements in language skills and numeracy through the use of educational apps.

Figure 4

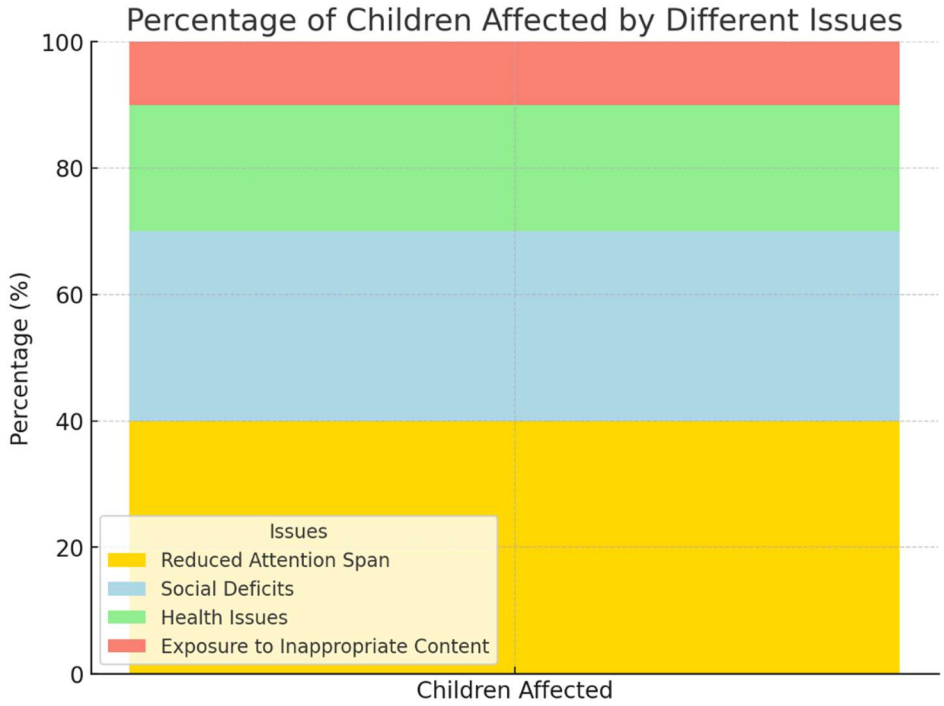


Figure 4 infers that Focus Deficit, which is the most common condition observed in 40% of children. Social Deficits that refer to possible problems with interpersonal contact applies to 30%, they have Social Deficits. Exposure to Inappropriate Content presents comparatively lesser consequences, having an impact of 20% and 10% respectively, but are still significant. All the children surveyed are affected by these problems, proving that it is necessary to do as much as possible to address these problems.

3.3 Risks of Early Technology Exposure

1. **Reduced Attention Span**

o Survey results indicated that children with more than 3 hours of daily screen time were more prone to distraction during offline activities.

Table 1: Survey Results on Screen Time Habits

Screen Time Category	**Percentage of Children (%)**	**Key Observations**
Less than 1 hour per day	25%	Minimal negative impact observed.
1-2 hours per day	40%	Optimal engagement with educational content.
2-3 hours per day	20%	Increased signs of reduced attention span.
More than 3 hours per day	15%	Higher likelihood of developmental concerns.

The table shows contrasting trends in screen time duration and the extent of its effect on children under 8 years of age.

Minimal Screen Time (<1 hour/day): This category was observed in 25% children and has the least negative findings reflected by which support that restricted use of the digital gadgets enhances the children, cognitive, social and physical well being.

Moderate Screen Time (1-2 hours/day): This category is for 40% of children and reflects the most beneficial position, in terms of effective interaction with the educational material. This means that carefully selected, on appropriate age, and in reasonable amount media content enhances learning and growth.

Extended Screen Time (2-3 hours/day): This duration is with noticeable changes in children's behavior : for the 20 per cent of the totality of the children they cannot attract their attention any more. This makes the observation of the system that there are potential risks of both cognitive and social cost as exposure increases.

Excessive Screen Time (>3 hours/day): Identified in 15% of children, this group is more likely to have developmental issues and namely social interaca-tion and Physical Health problems meaning that the long-term unrestricted use is dangerous.

2. **Social Interaction Deficits**

o Parents observed decreased interest in outdoor play and face-to-face interactions in children with high screen usage.

3. **Physical Health Issues**

o 40% of parents reported sleep disturbances linked to nighttime device use.

4. **Obscenity**

o Some parents seek to put restrictions to the type of materials that their children get access to, however, in the process only 10% of children get to come across age restricted content by mistake. parents reported improvements in language skills and numeracy through the use of educational apps.

5. **Exposure to Inappropriate Content**

o Despite parental controls, 10% of children accidentally accessed age-inappropriate material.

o Negative effects were less evident among children whose parents engaged in co viewing and or discussion regarding the contents.

o Educational and entertaining or interactive material was found to be related to positive behaviors while video streaming was associated with negative behaviors. Content

o Educational and interactive content was associated with positive outcomes, whereas passive entertainment (e.g., video streaming) correlated with negative behaviors.

Table 2: Reported Risks of Technology Use

Reported Risk	Frequency (% of Respondents)
Reduced attention span	40%
Social interaction deficits	30%
Physical health issues	20%
Exposure to inappropriate content	10%

The table highlights the prevalence and types of risks associated with early technology exposure in children under 8, as reported by respondents:

Reduced Attention Span (40%): This is the most widely identifying risk indicating that more than 70% of children found long or self-directed screen time interferes with their capacity to pay attention and persevere for offline tasks.

Social Interaction Deficits (30%): Almost half of the respondents noted less, or no, face-to-face communication and less outdoor play in children, which could indicate that technology has a negative impact on the critical social skills of children.

Physical Health Issues (20%): An appreciable proportion of respondents associated screen time, sleep issues and reduced physical activity and other related health issues making it clear that screen time should be accompanied with adequate physical activity.

Exposure to Inappropriate Content (10%): However, this continues to be a fairly real possibility, just one that occurs less often—a sign of issues with parental mediation or the ability to adequately oversee children's interactions online.

4.Discussion

4.1 Balancing Benefits and Risks

These results support the propositions that the effects of technology are moderated by screen time, type of content, and parental mediation. Research shows that technology's favorable outcomes are even more pronounced when technology is an addition to formal learning and school-aggrieved play. In contrast, constant and even unmonitored utilization has the opposite effects.

Policy Implications

These findings underscore the importance of the development of specific rules concerning screen and content exposure of children under 3 years of age.

• To increase parents/educators understanding of the threats and opportunities associated with technology use.

• Promoting successful media for children.

• Facilitating studies on the consequences of technology accessibility during preschool age.

Type of Content

o Educational and interactive content was associated with positive outcomes, whereas passive entertainment (e.g., video streaming) correlated with negative behaviors.

• Promoting awareness among parents and educators about the risks and benefits of technology.

• Encouraging the development of high-quality, child-friendly digital content.

• Supporting research on the long-term effects of technology exposure in early childhood.

Table 3: Types of Digital Content and Outcomes

Content Type	Engagement Level (%)	Positive Outcomes (%)	Negative Outcomes (%)
Educational Apps	85%	80%	10%
Interactive Games	70%	75%	15%

Passive Entertainment	50%	30%	40%
Inappropriate Content	10%	0%	100%

The table illustrates the varying engagement levels and outcomes associated with different types of digital content for children under 8 years old:

Educational Apps: Having the highest engagement level of 85%, and positive outcomes, at 80% educational apps are beneficial in educations, development, and learning. Negative consequences (10%), therefore, are negligible and this we attribute to programs' structure alongside appropriateness to the age of the participants involved.

Interactive Games: These exhibit moderate level of cooperation (70%) and positive effect (75%), which implies that the exhibits could be used in the purpose of problem solving and creativity. But a slightly higher percentage of negative consequences (15%) evidence the need to control content quality and reduce the time spent on websites.

Passive Entertainment: Compliance is considerably higher (50%) than engagement (25%), while multiple outcomes are much lower – positive (30%) and negative (40%). This implies that viewing passively, for example streaming video programs provide little learning benefit and may harm in other ways such as shortening the viewers' attention span.

Inappropriate Content: This category has 10% of the engagement score but no positive outcomes and the highest negative outcomes at 100%. This is majorly the significant harm as associated with societal costs of untamed Internet browsing pointing to the need for strengthened parenting control and Internet censorship.

4.2 How to Increase Responsibility in the Use of Technology.

1. Set Age-Appropriate Limits

o Follow AAP guidelines: No television for children below 18 months; no more than two hours of educational programs a day for children between 2 and 5 years.

2. Promote television watching of programs together and discussing them. Parents should be involved during the use of screen-based devices to improve learning and reduce harms and fix time for children under 18 months, except for video chatting; limited, high-quality screen time for children aged 2-5 years.

3. Encourage Co-Viewing and Interaction

o Parents should actively engage with their children during screen use to enhance learning and mitigate risks.

Table 4: Parental Involvement and Impact on Children

Parental Involvement	**Children with Positive Outcomes (%)**	**Children with Negative Outcomes (%)**
High (co-viewing & discussion)	90%	10%
Moderate	65%	35%
Low	30%	70%

The table highlights the significant role of parental involvement in influencing the outcomes of technology use among children under 8 years old:

High Parental Involvement: In cases where parents co-view and discuss with them about digital content, 90% children have positive impact and 10% have negative impact. This shows that active guidance optimises the learning as well as developmental gains derived from technology use.

Moderate Parental Involvement: Occasional monitoring leads to a decline in positive outcomes by 65 percent and negative outcomes increasing to 35 percent. This might mean that intermittent participation of parents in a child's life exposes that child to certain dangers.

Low Parental Involvement: Where there is little or no parental involvement, only 30 percent of children benefit while seven percent suffer adverse consequences. This implies that autonomous technology use results in higher chances of developmental and behavior issues.

4. Integrate Online and Offline Technologies

o Make sure technology use becomes a form of play, reading or interaction rather than replacing them.

o Engage in tools meant for filtering and blocking and age-restricted contents.

o Cultivate higher order thinking abilities in young people that will help them to secure responsible use of the new technologies: No screen time for children under 18 months, except for video chatting; limited, high-quality screen time for children aged 2-5 years.

5. Balance Digital and Offline Activities

o Ensure that technology use does not replace physical play, reading, or social interactions.

6. Use Parental Controls

o Utilize tools to monitor and restrict access to age-inappropriate content.

7. Promote Digital Literacy

o Teach children critical thinking skills to navigate digital spaces safely and responsibly.

5. Conclusion

Efficiency and innovation of the early exposure of technology children below 8 years is a mixed blessing. Technology is not without its drawbacks, when one is implementing it in learning process. However, based on the recommendation provided in this paper, parents, educators, policymakers and others involved in the upbringing of young children can maximize on technology usage whilst ensuring they do not harm the young ones.

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